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AUTHOR Belsky, Jay
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ABSTRACT

To assess the effect of setting on mother-infant interaction, 24 twelve-month-old children and their middle class mothers were observed on two occasions, a week apart. Half of these dyads were seen twice at home under naturalistic conditions or twice in the lab in a free play situation. The remaining 12 pairs were observed once in each location (order counterbalanced). General level of maternal functioning, but not infant functioning, was greatly affected by setting; mothers attended to, talked to, responded to and stimulated their children more frequently in the lab than at home. In addition, a change in setting tended to disrupt the individual differences in maternal rates of responsiveness observed consistently within a given setting. These results are discussed in terms of the differential demands placed upon mothers in each setting and their tendencies to behave in a more socially desirable manner in the lab. Individual differences in infant behaviors (e.g., vocalization, cry, smile) were more stable across settings than within settings, suggesting that infants were responding consistently to the strangeness inherent within each observational context. The total corpus of results is discussed in terms of the generalizability of laboratory findings to real world settings. (Author/MS)

Mother-Infant Interaction at Home and in the Laboratory: The Effect of Context*

Jay Belsky
Cornell University
Department of Human Development and Family Studies

In recent years, criticism of the laboratory as a context for research in child development has increased (Bronfenbrenner, 1974; McCall, in press). Such criticism seems to be especially pertinent to laboratory studies of the parent-child relationship. Robinson and Rackstraw (1967) have argued, for example, that the lab may encourage socially desirable behavior while Baumrind (1968) has maintained that this setting provides persons, particularly parents, with far more control over their own behavior than they would ordinarily have at home. As a result of these potentially distortive influences, Bronfenbrenner (1976) has argued that many of the research findings emerging from lab investigations may be ecologically invalid.

If these contentions are, in fact, true, then there appears to be good reason to question much child development research. This would seem to be especially the case for studies aimed at obtaining, within the confines of the controlled laboratory context, representative slices of everyday behavior patterns - as is so often the intention of parent-child interaction studies. Investigations conducted in the lab that do not aim to gather such representative data are not as subject to these particular criticisms. Nevertheless, they have their own validity problems since they still must demonstrate that data gathered in the lab provides reliable information about behavior in the real world to which so many lab studies hope to generalize their findings.

The study I am going to report today was conducted in order to discern whether mother-infant interaction observed in the laboratory is representative of such interaction as it occurs under naturalistic conditions at home. If, as predicted, it is not, then serious questions must be raised regarding the findings of lab investigations that have presumed that behavior observed in this context is representative of, and therefore generalizable to, another context, namely the everyday home environment.

With this goal in mind, 24 middle class mothers and their 12 month old infants were observed on two occasions, approximately a week apart; they were seen twice at home, twice in the lab, or once in each location.

Before proceeding to report findings regarding home-lab differences in interaction patterns, I should point out that this study was not designed to test the effect of setting while strictly controlling all other factors. Rather, its intention was to discover whether a laboratory designed to reflect the type of situation so often employed by researchers, elicits behavior from mother and infant that is representative of the behavior which lab investigators are usually most interested in understanding, namely that which occurs within the everyday home environment. Therefore, a free play situation was created in the lab in contrast to a naturalistic situation at home. Specifically, mother and infant were observed from behind a one-way mirror in the lab, which was arranged to resemble a living room, after mothers had been instructed to pretend they were at home with free time on their hands. At home, on the other hand, mothers were instructed to go

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about their regular household routine and disregard the observer as he recorded the infant's and mother's behavior. In both settings, it should be noted, mothers were informed that the observer was interested in studying infant behavior.

Design and Procedures

Having set the stage for the investigation, let me tell you about the design and procedures. Twenty-four families were recruited from birth announcements listed in the local newspapers and consecutively assigned to one of four treatment conditions; treatment one was seen twice in the home, treatment two twice in the lab, and treatments three and four once in each location with order counterbalanced. Thus we have a Home-Home, a Lab-Lab, a Home-Lab and a Lab-Home treatment. Observations in each setting lasted approximately 30 minutes.

Twenty-seven maternal and 14 infant behaviors were recorded in a two columned stenographic notebook by means of a short hand notational system (Clarke-Stewart, 1973). Maternal behavior was recorded on the left side of the page and infant behavior on the right side. Behaviors occuring at the same time were recorded on the same horizontal line, sequential behaviors were recorded on alternate lines. Every 15 seconds, at a signal conveyed by a portable cassette recorder, the observer made a mark on the notebook line. Any particular behavior was recorded only once per 15 second period unless it was interrupted by another behavior and then resumed. Whenever the behavior of one member of the dyad was judged clearly to be a response to a behavior of the other dyad member, a line was drawn connecting the two notations.

The technique for testing interobserver agreement focused upon the sequencing of maternal and infant behavior in interaction. Following practice in coding, tests of interobserver agreement were made on five 10 minute samples of interaction during two live laboratory observations prior to data collection and one laboratory observation while data was being gathered. An agreement was scored each time two observers recorded the same behavior in the same 15 second period. Agreements and disagreements were also scored with reference to the lines contingently relating two mother and infant behaviors. Across all tests of reliability, percent agreement (agreements/agreements plus disagreements) ranged from .76-.95. Having achieved adequate interobserver agreement, the author conducted all 48 observations, even though he was not blind to treatment condition.

Variables Employed in Data Analysis

The original total of 41 recorded behaviors was reduced to 20 maternal, infant and dyadic variables by combining some behaviors and eliminating those which were infrequently coded. Analysis of the intercorrelation among these variables guided the creation of summary variables. Five such variables were generated:

(1) Maternal Activity--consisted of the arithmetic sum of the frequencies of Stimulation, Instruction, Vocalization and Undivided Attention minus No Attention. (Individual variable scores were subtracted when they negatively correlated with the other components of the summary variable.) Stimulation was recorded each time mother attempted to capture the child's attention with some object (e.g., book, toy), instruction on each occasion that mother verbally directed the baby to do

something (e.g., come here, give me the bottle), and vocalization on each occasion that mother spoke to the baby for some purpose other than to direct him (e.g., Is that a doggy?, Oh what a pretty dolly). Undivided Attention refers to 15 second episodes in which mother directed 100% of her attention toward infant. Conversely, No Attention refers to 15 second episodes in which mother failed to direct any attention whatsoever toward infant. (Both these evaluations regarding maternal attention were made during behavior recordings.)
(2) Maternal Responsivity--consisted of the arithmetic sum of four conditional probabilities describing the rates at which mothers contingently responded to their babys' (a) vocalizations and (b) inspections of objects or explorations of the environment. Maternal response rates to both baby's vocalizations and inspections were calculated in terms of (1) maternal vocalization as the response and (2) all other maternal behaviors combined as the response (e.g., look at, touch, smile at).
(3) Infant Activity--consisted of the arithmetic sum of frequencies of Vocalization, Smile, and Look At mother, minus the frequencies of Move Toward mother and Cry. Infant vocalization was coded each time the baby made a non-distress vocalization (to his mother or to no one in particular); look at mother each time the baby focused his visual attention on his mother; and move toward mother each time the baby locomoted toward the mother to come within one to two feet of her. Fret/cry was recorded once during each 15 second episode in which the infant expressed distress, smile during each 15 second episode in which the infant laughed or smiled (at his mother or at no one in particular).
(4) Infant Responsivity--consisted of the arithmetic sum of four conditional probabilities describing the rates at which the infant responded to his mother's (a) vocalizations and (b) stimulations. Infant response rate to both maternal behaviors were calculated in terms of infant vocalization as a response. In addition, a second rate of response to maternal vocalization described the probability of the infant responding with any other behavior (e.g., look at, smile, move toward). The second rate of response to stimulation described the probability of the infant inspecting the object his mother stimulated him with.
(5) Dyadic Interaction--consisted of the arithmetic sum of three variables describing the mother-infant pair as a unit of analysis, delineating neither participant as solely responsible for the behavior of concern (cf. Hartup and Lempers, 1973; Lewis and Lee-Painter, 1974). (a) Contingent Interaction represented the number of 15 second episodes in which either mother or infant responded contingently to the behavior of the other on at least one occasion. (b) Two Step and (c) Three Step Interactions represented the number of mother-infant or infant-mother and mother-infant-mother or infant-mother-infant contingent interaction sequences during each observation (cf. Gewirtz and Gewirtz, 1965; Wright, 1967).

Results and Discussion

The data was analyzed by means of a 2 (sex) X 2 (session) X 4 (treatment) analysis of variance; each boy and girl and his/her mother was exposed to two sessions in one of four treatments. In Treatment One (T_1) and Two (T_2) subjects were seen twice in the same setting, treatment one dyads in the home and treatment two dyads in the laboratory. In Treatment Three (T_3) and Four (T_4) subjects shifted settings across sessions in a counter balanced order; treatment three dyads were seen first in the home and treatment four dyads first in the lab.

For the present study, comparisons of primary interest focused upon differences between the home and the lab and were tested in two separate ways in the study design. The first test involved comparison of T_1 (Home-Home) and T_2 (Lab-Lab) means; the second involved the Treatment X Session interaction of T_3 (Home-Lab) and T_4 (Lab-Home) (see Table 1). The results of these two comparisons can be found in Table 2 which presents the home-lab means of T_1 and T_2 treatments and T_3 and T_4 treatments separately.

Insert Tables 1 and 2 about here

The main effect for Treatment and the planned comparison of Home-Home (T_1) and Lab-Lab (T_2) means were significant for three of the five variables tested: Maternal Activity, Maternal Responsivity, and Dyadic Interaction. Inspection of Table 2 reveals that mothers observed twice in the lab were more than four times as active and almost twice as responsive as mothers observed twice at home. In addition, mother-infant dyads observed twice in the lab were almost twice as interactive as those seen twice at home.

The Treatment X Session interactions and the planned comparisons of T_3 and T_4 within this interaction were also significant for the same three variables discussed above. Thus, two independent tests of mean differences between home and lab scores proved to be statistically significant for the two maternal and the single dyadic variables. Inspection of Table 3 indicates that mothers seen once at home and once in the lab were almost twice as active and responsive in the laboratory. Moreover, these mother-infant dyads interacted contingently more often in the laboratory than at home.

The only other effect that achieved statistical significance was the Sex X Treatment interaction for the variable Infant Activity. The fact that boys were more active in the home than in the lab (Ms: 95.4-79.6), whereas girls were equally active in each setting (Ms: 78.0-79.4) would appear to account for this unpredicted interaction. This finding must be interpreted with caution, however, since neither of the single degree of freedom comparisons highlighting this interaction proved reliable.

It would appear then, in accordance with predictions, that laboratory based observations of mother-infant interaction are not representative of, and therefore not generalizable to, naturalistic interaction patterns in the home. This seems to be especially true of maternal behavior as mothers were observed to behave in a more socially desirable manner in the lab, attending to, vocalizing to, responding to, and stimulating their infants more while ignoring them less in this setting than at home.

It would seem that the differential demands placed upon mothers in these two settings, in addition to possible tendencies to behave in a more socially desirable manner in the laboratory, account for the setting differences noted in this investigation. In the laboratory, unlike the home, there is no house to clean, no meal to prepare, and no other children to care for. And the utilization of a free play situation in the lab and naturalistic conditions at home makes such differences clearly apparent. I want to suggest then, that the psychological situations created in each setting by the combined impact of observation location

and directions given to mothers, rather than the simple physical differences between these two settings, were responsible for the home-lab differences reported here today.

It could be argued in attempt to contest my interpretation of the observed home-lab differences, that the apparent effect of observational context was actually a function of a more general pattern of behavioral instability. That is, that the observed home-lab differences were really the result of natural fluctuations in maternal behavior. This explanation seems unlikely, though, since no such natural fluctuations were seen from session to session for the home-home and lab-lab treatments in which setting remained constant across observations.

Examination of across session correlations (see Table 3)* on the maternal measures for each of the four treatments tends to confirm this conclusion. That is, Pearson product moment correlations for the two maternal variables, activity and responsivity, were larger, though not significantly, for dyads observed twice in the same location, those in the H-H and L-L treatments, than for those observed in different settings, namely the home-lab and lab-home treatments. In finding that the rank ordering of mothers on these two variables was relatively unstable across settings, further support is provided for the conclusion that observations of mother-infant interaction in the lab are not representative of such interaction at home. It seems then, that not only are mean levels of behavior inconsistent between the home and the lab, but so are individual differences between mothers.

Having noted this trend with regard to maternal behavior, it was quite surprising to find that infants observed in different locations, those in the home-lab and lab-home treatments, maintained their individual differences to a significantly ($p < .01$) <u>greater</u> extent than infants observed twice in the same location, those in the home-home and lab-lab treatments--at least with regard to infant activity. Since this pattern was opposite of that predicted, it is tentatively suggested that infants in the home-lab and lab-home treatments were consistently responding to the strangeness of each observation. In the home the presence of an unfamiliar observer was strange and in the lab the physical environment was strange. Infants in the other two treatments, though, confronted two psychologically dissimilar situations since the initial strangeness of the first observation, whether in the home and in the lab, became familiar by the second session.

In general, then, comparison of maternal, infant and dyadic behavior, within and across settings, indicated that the laboratory, at least when loosely structured in a free play situation, elicits behavior which is not fully representative of mother-infant interaction in the everyday world. This was found to be especially true of maternal behavior as well as of the mother-infant dyad when considered as a unit of analysis in and of itself. As a result of these findings, serious questions must be raised regarding laboratory research that attempts to generalize its results to real world settings <u>on the presumption</u> that behavior observed in the laboratory is representative of that observed under more naturalistic conditions. Such criticism of laboratory research may be particularly important with regard to studies of social class differences in maternal behavior

*Admittedly, these correlations are based on small ns and should be interpreted with caution.

(e.g., Hess and Shipman, 1965), especially if, as Sroufe (1970) has contended, mothers of different social classes respond differently when placed in a strange laboratory in a university setting.

In concluding, I should stress the fact that this critique of the laboratory as a context for research does not imply that investigations in this setting have no value. Rather, as Bronfenbrenner (1976), Parke (1976), and McCall (in press) have maintained, the potential value of the lab when used for testing models, conducting exploratory research, and functioning as a diagnostic tool as is the case with Ainsworth's Strange Situation, is unlimited. Findings emerging from such investigations though, should not be generalized to other contexts unless across setting consistency can be empirically documented.

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Table 1

Study Design

Session	Treatment T_1 (n=6)*	T_2 (n=6)	T_3 (n=6)	T_4 (n=6)
I	Home	Lab	Home	Lab
II	Home	Lab	Lab	Home

*Three boys and three girls in each treatment

Table 2

Mean Home and Lab Scores on Five Dependent Variables Separately for T_1 -T_2 and T_3 -T_4

Variable	T_1 and T_2 Home		T_1 and T_2 Lab	T_3 and T_4 Home		T_3 and T_4 Lab
1. Maternal Activity[a]	75.3	**	316.0	120.6	**	234.5
2. Maternal Responsivity[b]	81.5	**	155.7	90.4	**	163.2
3. Infant Activity	77.0		71.6	96.4		87.4
4. Infant Responsivity	165.7		182.8	205.2		213.0
5. Dyadic Interaction[c]	104.7	**	181.4	123.0	**	172.7

[a]Main effect for treatment, $p < .001$.
Treatment X Session Interaction, $p < .001$.

[b]Main effect for treatment, $p < .15$.
Treatment X Session Interaction $p < .01$.

[c]Main effect for treatment, $p < .05$.
Treatment X Session Interaction, $p < .01$.

** $p < .01$

Table 3

Across Session Correlations for Maternal and Infant Variables

Mother	H-H (n=6)	L-L (n=6)	H-L (n=6)	L-H (n=6)
Activity	.90*	.92*	.73+	.85*
Responsivity	.68	.61	.51	.40
Overall Average[a]	.82*	.82*	.64	.68
Infant				
Activity[b]	-.08	-.38	.91*	.66
Responsivity	.93**	-.13	.34	-.78
Overall Average	.66	-.26	.74+	.33

[a]Based on Fisher Z transformations

[b](H-L) + (L-H) significantly different from (H-H) + (L-L): $p < .01$.

$^{+}p < .10$

$^{*}p < .05$

$^{**}p < .01$